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D5.6 Final Training Materials

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Due date	31 August 2020 (postponed from 29 February 2020)
Authors	Frances Madden (British Library, https://orcid.org/0000-0002-5432-6116)
	Tina Dohna (PANGAEA, https://orcid.org/0000-0002-5948-0980)
	René van Horik (DANS, https://orcid.org/0000-0001-6899-760X)
	Artemis Lavasa (CERN, https://orcid.org/0000-0001-5633-2459)
	Robin Dasler (DataCite, https://orcid.org/0000-0002-4695-7874)
Abstract	This report provides an overview of the training materials created within FREYA from the beginning of the project to Month 33 (August 2020).
Status	Submitted to EC 31 August 2020

FREYA project summary

The FREYA project iteratively extends a robust environment for Persistent Identifiers (PIDs) into a core component of European and global research e-infrastructures. The resulting FREYA services will cover a wide range of resources in the research and innovation landscape and enhance the links between them so that they can be exploited in many disciplines and research processes. This will provide an essential building block of the European Open Science Cloud (EOSC). Moreover, the FREYA project will establish an open, sustainable, and trusted framework for collaborative self-governance of PIDs and services built on them.

The vision of FREYA is built on three key ideas: the **PID Graph**, **PID Forum** and **PID Commons**. The PID Graph connects and integrates PID systems to create an information map of relationships across PIDs that provides a basis for new services. The PID Forum is a stakeholder community, whose members collectively oversee the development and deployment of new PID types; it will be strongly linked to the Research Data Alliance (RDA). The sustainability of the PID infrastructure resulting from FREYA beyond the lifetime of the project itself is the concern of the PID Commons, defining the roles, responsibilities and structures for good self-governance based on consensual decision-making.

The FREYA project builds on the success of the preceding THOR project and involves twelve partner organisations from across the globe, representing PID infrastructure providers and developers, users of PIDs in a wide range of research fields, and publishers.

For more information, visit www.project-freya.eu or email info@project-freya.eu.

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Executive summary

This final report on training materials provides an update to D5.4 "Initial Training Materials" submitted in August 2019. It describes the approach taken to creating training materials in the FREYA project and provides an overview of the materials created and links to them. Over the course of the project, FREYA has hosted and contributed to numerous training events, hosted webinars and provided documentation on the services developed within the project. The submission of this deliverable was delayed by six months, to August 2020 to support the creation of further training materials such as the *Guides to Choosing Persistent Identifiers* which were published for public comment in May 2020 with a final version in July 2020. It was also possible to hold additional training events during this time, mostly online due to the impact of COVID-19, and these were recorded where possible in order to support future capacity building. In the final months of the project, this work will continue to ensure as much adoption as possible of the project outputs.

Contents

1   Introduction

Training materials for persistent identifiers (PIDs) have a wide range of aspects and are relevant to many communities including policy makers, librarians and researchers. This report describes the training materials created during the FREYA project; it was delayed from its planned submission in Month 27 of the project, February 2020, to Month 33, August 2020 to allow for the creation of additional materials and to support other project developments.

1.1   Training materials within FREYA

The FREYA project aims to extend the infrastructure for PIDs as a core component of Open Research in Europe and globally, by improving discovery, navigation, retrieval and access to research resources. The project's activities are built around three pillars: 1) the PID Graph which designs and implements this extended infrastructure, 2) the PID Forum, which engages with stakeholders, and 3) the PID Commons, which addresses the sustainability of the outputs created. Work Package 5 (WP5), Iterative Engagement, leads the work of building the PID Forum, of which training materials are a core component.

The creation of training materials is nested within the task of Supporting PID Adoption (T5.4), which also includes the running of tailored events. Training materials are vital to ensure the successful embedding of the use of persistent identifiers and the project's outputs by the communities for which they were designed. These two tasks are closely linked as seen in Section 2.8 of this report, one of the lasting outcomes of events are the materials created for them, which comprise an important category of training materials created in FREYA. Developing training materials aimed at different communities allows them to be adopted by other users in a "train the trainer" capacity, where attendees of training events or other interested parties can adapt FREYA's materials for their own purposes. Importantly, the FREYA project has leveraged collaboration between other EU projects to promote the use of PIDs within the projects themselves and the communities with which those projects engage.

1.2   Summary of D5.4

Deliverable 5.4 "Initial Training Materials"[1] described the approach and training materials created up to Month 21 of the project, August 2019. The main content covered included the update and migration of the Knowledge Hub, collaboration with other projects and past/future events. It also provided a list of all the training materials in both traditional (e.g. guides) and non-traditional (e.g. Jupyter notebooks) formats created to that point. The Appendix of this deliverable includes a list of these for reference. D5.4 assessed the successes and challenges associated with creating the materials and disseminating them. Each of the resources listed in Section 2 is considered in light of the challenges and successes noted.

In the section on Future Plans in D5.4, several activities were outlined for the following six months. While all of these activities were considered, not all were executed. For example, the addition of case studies were considered but eventually the team determined, in keeping with the Knowledge Hub as a PID resource designed for beginners, the level of material within it should be kept to a very accessible and entry level. However as we gathered feedback on the Knowledge Hub and the FREYA project participated in training events, it became clear that the resources sought by the community included help with choosing types of persistent identifiers, leading to the creation of the *Guides to Choosing Persistent Identifiers*. Other activities such as the creation of training materials for ROR identifiers were explored but not pursued, as the timeframes did not synchronise with FREYA's tasks.

In addition, it became evident that there would be concerted effort around the launch of new services towards the end of the project in 2020, such as the GraphQL Application Programming Interface (API), PID Notebooks and the PID Services Registry. Therefore delaying the submission of this deliverable to support

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[1] https://doi.org/10.5281/zenodo.3462141

the creation of training materials around these new services would benefit the project as a whole. As stated in D5.4, we continued to evaluate events, which were held in person and online and collated the responses for analysis to inform future events—these are alluded to in the descriptions of the events held.

1.3   Structure of this report

Section 2, the main body of this report outlines the training materials created during the period of Month 21 to Month 33 of the project, from August 2019 to August 2020. The materials cover a broad range of topics and formats, providing resources to a range of audiences. For each training resource, details of where the resource can be accessed as well as its intended audience and reach where known are included in a summary table for each section. The Appendix lists all the training events and resources from Month 1 to Month 33 of the project.

2 Training materials and approach

This section includes details of all training materials during the period from Month 21 to Month 33 of the project and describes the approach taken in their creation.

2.1 Knowledge Hub on pidforum.org

2.1.1 Migration from readme.io

As outlined in D5.4 "Initial Training Materials", the decision was made in early 2019 to migrate the Knowledge Hub and its materials, created in THOR the predecessor project to FREYA, from the readme.io site to pidforum.org. As much of the existing content on the Knowledge Hub had become outdated, it was decided to overhaul the content and that, in the context of the wider pidforum.org site, the Knowledge Hub should focus on the basics of PIDs. The initial version of the Knowledge Hub was released in August 2019.

2.1.2 Feedback on Knowledge Hub

Feedback on the Knowledge Hub was gathered through a number of routes including via Mentimeter (see Figure 1 and Figure 2) at a webinar for FREYA ambassadors in September 2019 (see0), a session on pidforum.org at PIDapalooza in January 2020 and via a Google form. Fifteen meaningful responses were received, the responses were synthesised and the following changes were made (Table 1). While the number of responses may be low, they were considered individually and were valuable to the project.

Suggested Change	Action Taken
Include more details about APIs, technical information (received before the "Developer" section went live).	PIDs for Developers section was updated. A section about new types of PIDs was also added.
Include details about new and emerging PIDs.	A section on new PID types was published.
Include more information about the importance and 'why' of PIDs.	The 'Why use PIDs' topic was published and updated. Following the creation of a graphic during the Turing Way Book Dash event (see below), the graphic was inserted into the page.
Include resources in other languages.	Ambassadors were asked to translate the 'Why use PIDs' topic into their native language. Four translations were published including Arabic, Slovakian, Ukrainian and Portuguese.
Training and dissemination material should include complete guides on services integrated into EOSC hub.	The PIDs for Developers page was reviewed to ensure the support pages for all EOSC services were linked correctly from that page.

Table 1 Changes made to the FREYA Knowledge Hub
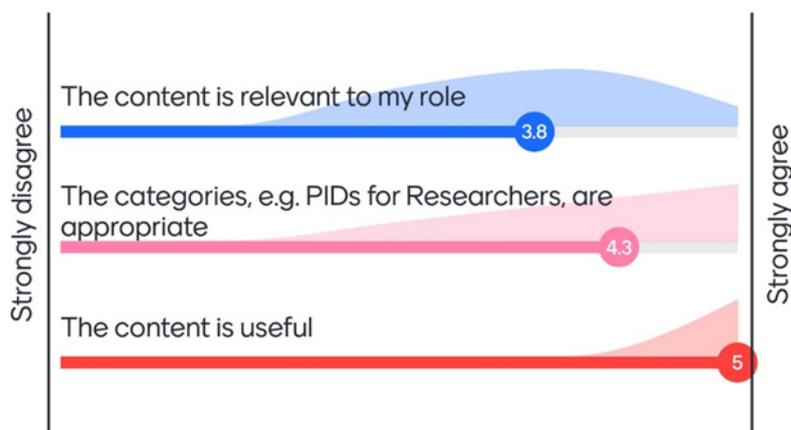
*Figure 1 Mentimeter Feedback from Ambassador Webinar, September 2019*
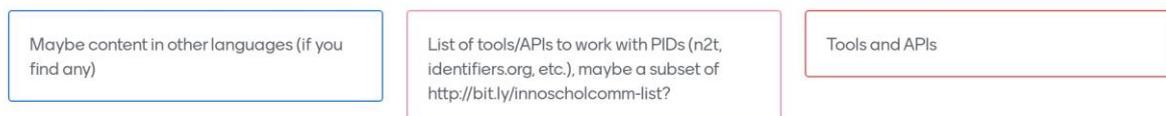
Figure 2 Mentimeter Feedback from Ambassador Webinar, September 2019

2.1.3   Future of Knowledge Hub after FREYA

The future of the Knowledge Hub after the end of the project has been a recurring discussion throughout its development. At the point of submission of D5.4, it was agreed that this would be a focus of work for the coming period and various options were explored. It was agreed by the creators of the content that they would be unable to maintain it after the project ended due to the lack of dedicated resources. Based on experience from migrating the THOR Knowledge Hub, the team were worried that the content would become outdated quickly and require regular updates. The team discussed the idea of the Knowledge Hub being curated and updated by the community, however the team expressed concern that there would be a lack of engagement and the same risks applied as if the original content creators had this role.

During the discussion of the concept of community curation, one team member suggested migrating the content to a location where community curation is more inbuilt and established, namely in the Wiki community. The team arranged a discussion with a Wikimedian, Andy Mabbett, to gather further details about how the Wiki community works and to explore the concept of migrating the content to Wikipedia or Wikiversity. It became apparent the Knowledge Hub content would need substantial rewriting for inclusion on Wikipedia and care would need to be taken to ensure that Wikipedia's editorial rules were not breached, as it does not allow users to upload content about themselves. Wikipedia also does not accept training materials, so the team considered Wikiversity, which is designed to support training materials, as

an alternative. It appeared the community surrounding Wikiversity is much more limited than Wikipedia, and the same issues as hosting the content on pidforum.org would persist. Eventually the team decided to keep the content of the Knowledge Hub under review until the end of the project. At that point, the description of the Knowledge Hub will be changed to indicate that the resource is no longer being updated but any changes required can be reported to the pidforum.org moderators. This will take place in November 2020.

2.1.4   Lessons learned

This piece of work has highlighted the challenge of sustaining resources created during a project and keeping them available for the long term. However, the fact that the Knowledge Hub is hosted on pidforum.org does ensure its long-term future and discoverability. To ensure pidforum.org's sustainability FREYA has launched a call for expressions of interest in supporting it in the future, with the organization taking on its ongoing hosting due to be decided before the end of the project.[2]

Title	Type of Resource	Reach/Impact	Link
Knowledge Hub	Informational resource	Librarians & Repository Managers Funders & Policy Makers Developers Researchers Publishers 8,639 views of all pages[3]	https://www.pidforum.org/c/knowledge-hub/11

Table 2 Reach and impact of the Knowledge Hub

2.2   Dedicated webpages

To highlight the work FREYA partners have done to develop the PID Graph, we have created several dedicated pages on our project website. In particular, we have a separate page describing the work on Provenance in the PID Graph and on the Research Organization Registry (ROR) developed as part of the work on organizational identifiers. In addition, a page describing the prototypes of new PIDs is also available. While all of this work is described in full detail in our deliverables (D2.2, D3.3, D4.2, and D4.4), the pages are meant as a summary, providing our stakeholders with a brief overview of the work FREYA has done to develop the PID Graph.

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[2] https://www.project-freya.eu/en/news/newsitems/can-you-help-sustain-the-pid-forum-in-the-future
[3] All view figures correct at 10 August 2020.

Title	Type of Resource	Reach/Impact	Link
Provenance Services	Webpage summarizing the FREYA work on the development of the PID Graph with a focus on provenance	Librarians & Repository Managers Funders & Policy Makers Early Adopters	https://www.project-freya.eu/en/pid-graph/provenance
Research Organization Registry	Webpage summarizing the FREYA work on the development of the PID Graph with a focus on organizational identifiers	Librarians & Repository Managers Funders & Policy Makers Early Adopters	https://www.project-freya.eu/en/pid-graph/research-organization-registry
Prototypes of new PID Services	Webpage summarizing the FREYA work on the development of the PID Graph with a focus on the prototypes of new PIDs that have been developed	Librarians & Repository Managers Funders & Policy Makers Early Adopters	https://www.project-freya.eu/en/pid-graph/prototypes-of-new-pids

Table 3 Reach and impact of dedicated webpages

2.3   FREYA video "The Power of PIDs"

FREYA partners created a short educational video called "The Power of PIDs", addressing researchers and students who need information related to persistent identifiers (PIDs) for their own work. Figure 3 contains a still of the video. The video provides clear and easy to follow explanations around PIDs and the PID Graph, highlighting the benefits that PIDs embedded in PID Graphs provide to individuals and the research landscape, overall. The video has been posted on the PID forum, the FREYA project website, distributed through the FREYA YouTube channel and deposited on Zenodo. It is available to related projects as a training resource for PIDs in research. To ensure a professional look and flow of the video, a UK based company, Somersault, designed and created the animation.[4]

The video explains how PIDs can help make research more FAIR and provide benefits for researchers using them to identify and link different aspects of their research. Also emphasised is the importance of metadata describing the item, which can be accessed at any point through the PID itself. In this context, PID providers are introduced to clarify how PIDs are minted and how the linked metadata is stored indefinitely through central agencies.

The video presents a selection of currently mature and emerging identifiers, promoting the use of PIDs for people, publications, datasets, institutes, funding, and scientific instruments. The video goes on to explain how using PIDs enables linking research elements through machine-readable research graphs, such as the PID Graph. Using "Researcher Tom" as an example, the video demonstrates how he can link important information about his research (colleagues, datasets, institute, research funding etc.), while also connecting to other research items in the larger graph with PIDs. The emerging network (PID Graph) can be used by others to search out related research items, thereby improving data reuse and increasing the visibility of

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[4] https://www.somersault.agency

funders, institutes, people, data, publications etc. The video closes by providing additional resources for researchers as reference points (PID Forum, EOSC) and access to services (EOSC).
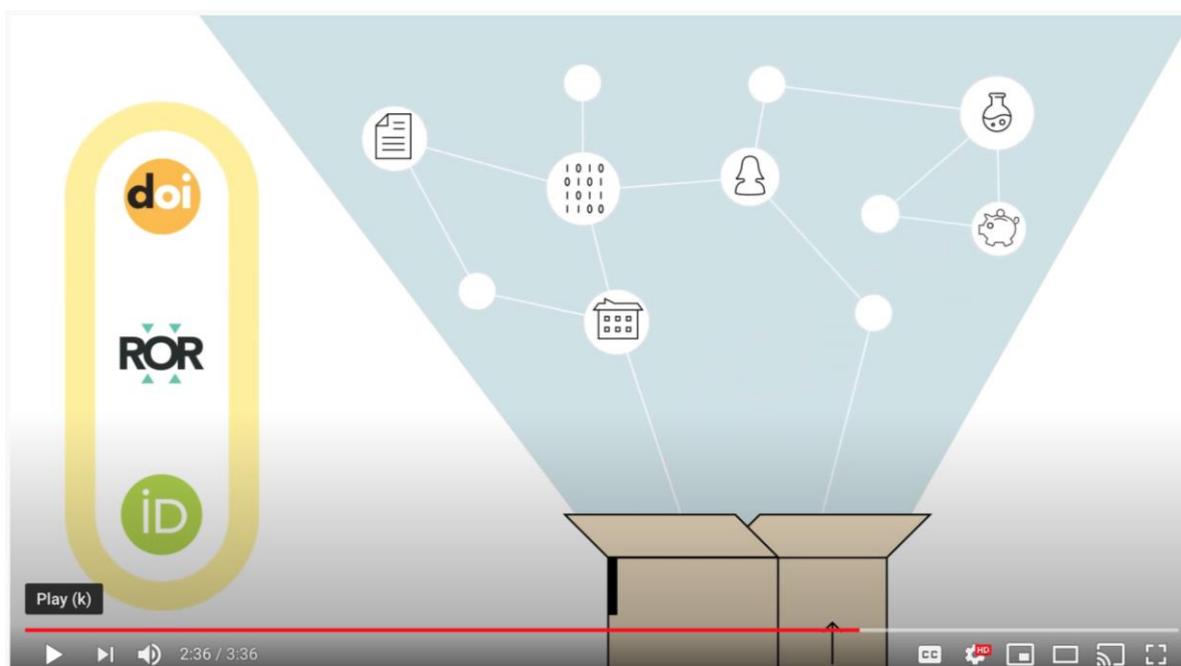
Figure 3 Still of the FREYA video "The Power of PIDs"

Title	Type of Resource	Reach/Impact	Link
The Power of PIDs	Video	Researchers 411 views	https://www.pidforum.org/t/the-power-of-pids-video/1063 https://youtu.be/9G4EMJCwCw4 https://doi.org/10.5281/zenodo.3977942

Table 4 Reach and impact of FREYA video

2.4   PID service provider support sites

The project determined PID service provider support sites to be the source of authority of documentation about PID services, as providers keep these updated as part of their normal business processes. The following sites contain details about services developed specifically within FREYA. A more complete list is available on the Developers section of the FREYA Knowledge Hub[5].

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[5] https://www.pidforum.org/c/knowledge-hub/pids-for-developers/38

Title	Type of Resource	Reach/Impact	Link
DataCite GraphQL Support site	Webpage	Developers Early Adopters	https://support.datacite.org/docs/datacite-graphql-api-guide
DataCite Provenance Metadata Tracking	Webpage	Developers Early Adopters	https://support.datacite.org/docs/tracking-provenance
PID Services Registry About page	Webpage	Developers Early Adopters	https://www.pidservices.org/about

Table 5 Reach and impact of PID service provider support sites

2.5   Guides to choosing persistent identifiers

Based on community feedback, the FREYA Project compiled short guides to help with choosing persistent identifiers for various types of entities already which have relatively mature identifier schemes. The first versions of these guides were released in May 2020 for community feedback and comment, via pidforum.org or via email throughout June 2020. Substantial feedback was received from across the community, primarily from six individuals. This feedback was reviewed and revised versions were developed in July 2020 and published the same month.[6]

While not intended to be fully comprehensive, these guides are designed to provide a starting point for anyone thinking about using persistent identifiers in their systems. Guides were created for the following entities:

- Publications
- Datasets
- People
- Organizations
- Software

A table summarising all of the guides is also available from Zenodo.

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[6] https://www.pidforum.org/t/guides-to-choosing-persistent-identifiers-your-feedback-wanted/1013/13
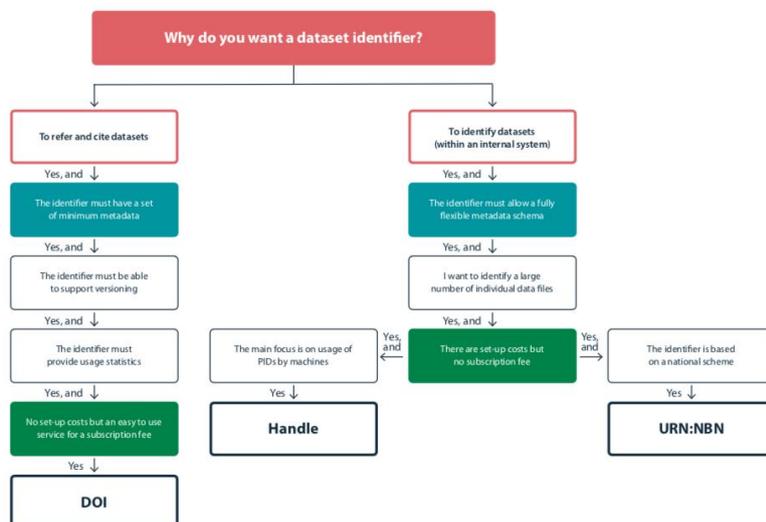
Figure 4 Example of one of the Guides on Choosing Persistent Identifiers (PIDs on datasets)

Title	Type of Resource	Reach/Impact	Link
Guides to choosing Persistent Identifiers	Documentation / Decision tree	Developers Librarians & Repository Managers Funders & Policy Makers 1,214 views 1,286 downloads	https://doi.org/10.5281/zenodo.3862655

Table 6 Reach and impact of guides to choosing persistent identifiers

2.6   Core PID services training materials: the PID Graph

At the time of submission of D5.4, a suite of materials including blog posts and Jupyter notebooks had been created to support the adoption of DataCite's GraphQL API, which powers the PID Graph, at that time in pre-release. Jupyter notebooks are an open source application that allows you to create and share

documents that contain live code, visualisations and narrative text.[7] Work developed on these notebooks throughout 2019, especially at the Software Graph Hackathon, which took place in December 2019 where the Jupyter Notebooks were developed and extended.[8] The Jupyter notebooks were showcased at several events including the FREYA co-located event at the RDA plenary in Helsinki to support the adoption and awareness of the potential of the API and used to showcase examples of it in action.

DataCite's GraphQL API was released as a production version in May 2020. In preparation for its release, several example queries were published on the PID Forum to allow for testing and demonstrate its usage. When the API was launched, DataCite published a blog post to describe its use. Further supporting materials were created for events and are described in FREYA PID Services and GraphQL API webinar and the FREYA PID Graph video demonstrator.

In addition, a subcontractor, Robert Petryszak, has been working on developing Jupyter notebooks to further demonstrate and build on the potential of the API and display example applications of it. These have been assigned DataCite DOIs and will be available via pidnotebooks.org, a site that DataCite will maintain. Jupyter notebooks were selected as a useful method to highlight the potential of the PID Graph and the notebooks' format allow for ample documentation and explanation and the results of the queries to be displayed in one place.

The PID Services Registry, a website detailing services related to persistent identifiers was launched in June 2020 and DataCite published a blog post describing its use and potential.[9]

Title	Type of Resource	Reach/Impact	Link
PIDNotebooks.org (*Launching August 2020*)	Website	Developers Early Adopters	www.pidnotebooks.org
Powering the PID Graph: announcing the DataCite GraphQL API	Blog post	Developers Early Adopters	https://doi.org/10.5438/yfck-mv39
Introducing the PID Services Registry	Blog post	Developers Early Adopters	https://doi.org/10.5438/pwjv-9m56

Table 7 Reach and impact of PID Graph related material

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[7] https://jupyter.org/
[8] https://www.project-freya.eu/en/events/software-graph-hackathon
[9] https://www.pidservices.org/

2.7   Disciplinary Guidance and Training Materials

In D5.4, several partners described plans of creating training materials aimed at their discipline. This section provides an update on the creation of these materials.

2.7.1   CERN

Guides for PIDs were created for the new website of the CERN Scientific Information Service (see Figure 5). The CERN Scientific Information Service (SIS) aims at efficiently managing, preserving and disseminating scientific information to make it openly accessible and reusable to CERN and the worldwide High-Energy Physics community, so this website is the most suitable place for providing guidance about PIDs.
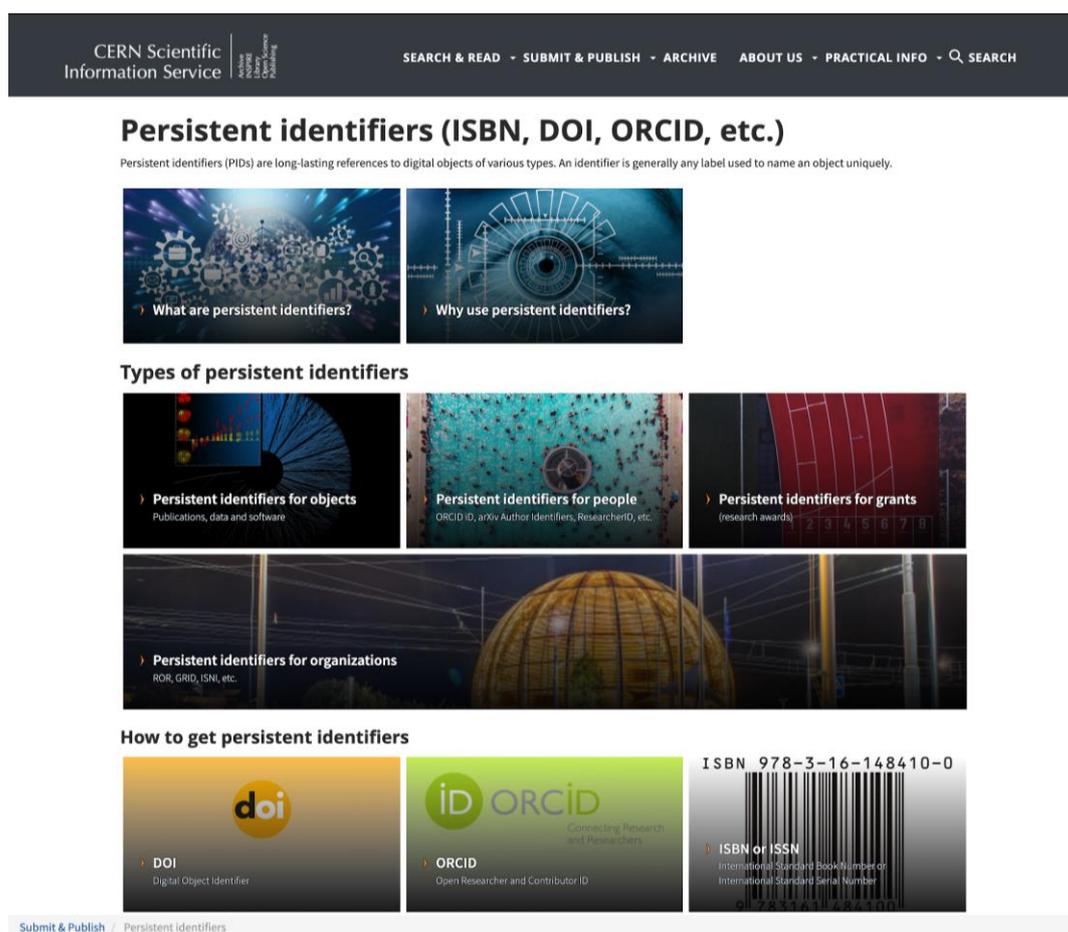
Figure 5 Overview page for the PID guides on the CERN SIS website

More specifically, the following pages have been published on the website:

- What are persistent identifiers?

- Why use persistent identifiers?

- Types of persistent identifiers

    - Persistent identifiers for objects

    - Persistent identifiers for people

    - Persistent identifiers for grants

- ○ Persistent identifiers for organizations
- ● How to get persistent identifiers
    - ○ DOI
    - ○ ORCID
    - ○ ISBN/ISSN
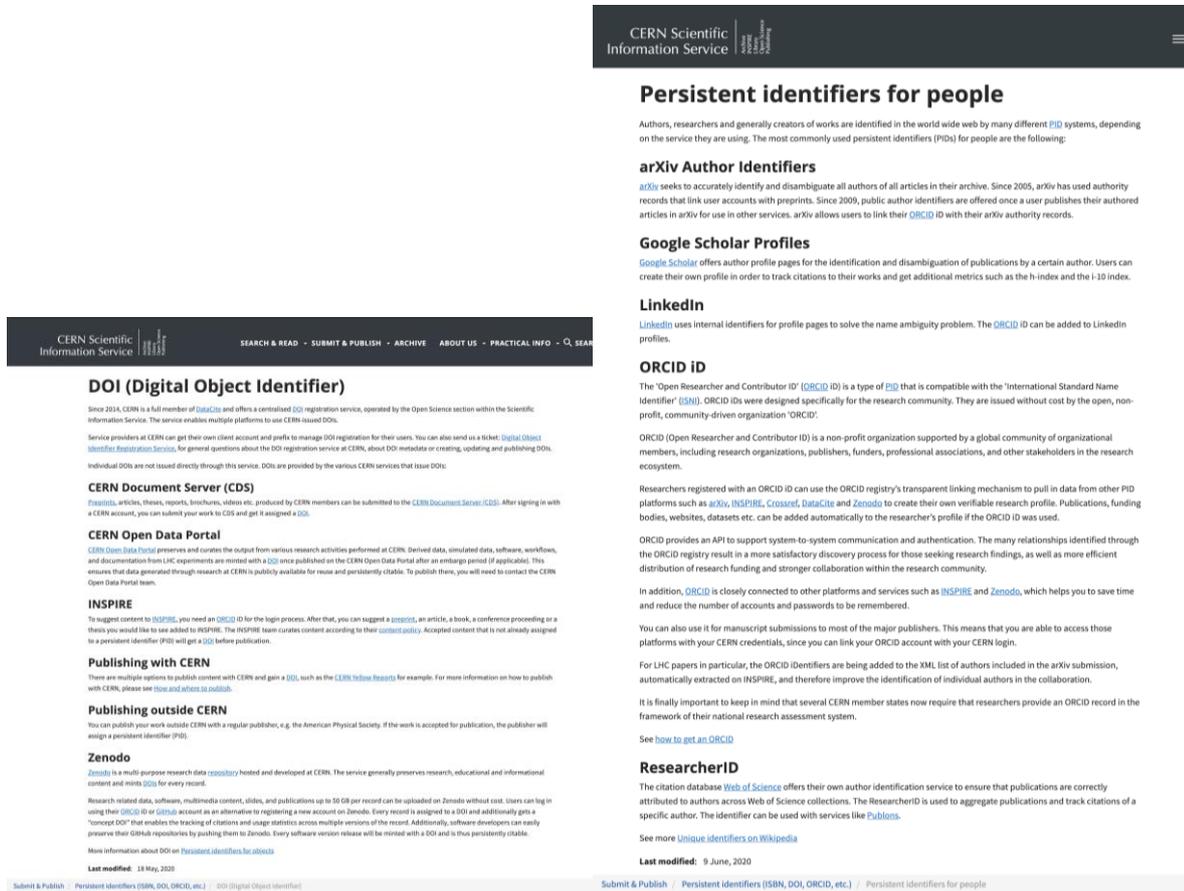
Figure 6 Example pages from the CERN SIS website

These guides include both general information as well as specific examples relating to High-Energy Physics information services and use cases. The pages will be updated as needed in the future. A planned task is to incorporate *Guides to Choosing Persistent Identifiers* (see Section 2.3) once the reviewing process for them is finalised.

Title	Type of Resource	Reach/Impact	Link
Persistent identifiers (ISBN, DOI, ORCID, etc.)	Documentation	CERN personnel, HEP community, General public (Researchers)	https://sis.web.cern.ch/submit-and-publish/persistent-identifiers

Table 8 Reach and impact of CERN's guidance/training material

2.7.2   PANGAEA

A resource created for the Earth Sciences community.

Title	Type of Resource	Reach/Impact	Link
Use of Persistent identifiers in PANGAEA Data publications	Blog, PANGAWiki documentation	Users of PANGAEA Data publishing service (Researchers)	N/A Not online yet

Table 9 Reach and impact of PANGAEA's guidance/training material

2.7.3   British Library

As part of the British Library's staff Open Access training programme, persistent identifiers are included in the introductory session. They are also planned to be included in subsequent sessions around increasing your research profile aimed at the staff in the library who actively engage in research relating to the Library's collections and in collaborative doctoral supervision. In addition, a suite of guides are due to be published in Autumn 2020 aimed at UK cultural heritage organizations on topics including open access and research data management, all of which refer to and support the use of PIDs.

Title	Type of Resource	Reach/Impact	Link
Introduction to Open Access	Training course	Librarians	N/A Face to face training course

Table 10 Reach and impact of BL's guidance/training material

2.8   Events

This section contains details of training events and events with a training component both organised by FREYA and others but where FREYA contributed. The materials created for an event are regarded as a lasting resource, which can be used to support facilitators of future events as well as providing a reference for those who were unable to attend live.

While all FREYA events and engagement activities were or will be reported in D5.5 "Second Report on the PID Forum" and D5.7 "Third Report on the PID Forum", these events are included here as they give an indication of the type of event and the event's, and therefore the training materials', reach to a live audience. As described in D5.4, "Initial Training Materials", we attempted to conduct an evaluation of all events to assess the extent to which they met attendees' expectations and the quality of the training provided and meaningful statistics are included here.

2.8.1   FREYA events

FREYA RDA co-located event "Connecting knowledge in the European Open Science Cloud"

On 21 October 2019, FREYA organised a co-located event at the 14th RDA plenary meeting in Helsinki. 35 participants registered, from diverse backgrounds in the research and e-infrastructure communities. With this event, we highlighted the work FREYA has done so far; with the aim of enabling interested stakeholders to use the services developed within FREYA, in particular the PID Graph. The half-day event started with a series of short presentations introducing PIDs and why they are useful, followed by a short overview of the project, the PID Graph, and the types of established and new PIDs we work with in the context of use cases.

Then a two-hour interactive tutorial session on how to query the PID Graph with Jupyter notebooks introduced GraphQL, its application to the PID Graph, and was followed by an introduction to Jupyter notebooks. Subsequently, there were two demo sessions with pre-written Jupyter notebooks: one on PID Graph Key Performance Indicators (KPIs), where the DataCite GraphQL API is queried to fetch summary statistics about the nodes and connections in it; and one retrieving and visualising all publications, datasets, and software by a particular researcher, using their ORCID ID (Figure 7). The participants were encouraged to experiment with the notebooks themselves by altering the code with their own queries. The final hour of the event was dedicated to the role of PIDs in the EOSC and sustainability in general. Of the 17 evaluation responses received, 94% said they understood the information presented and 88% said they were engaged throughout the session.
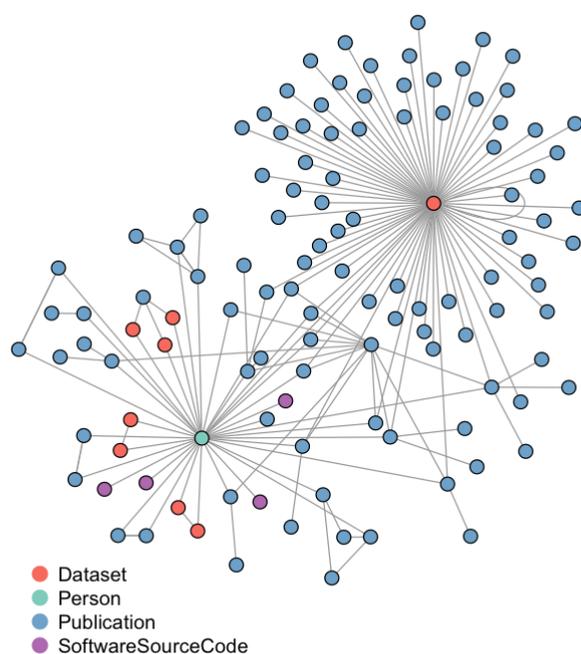

Figure 7 Visualization of publications, datasets, and software by a particular researcher using the DataCite GraphQL API

Title	Type of Resource	Reach/Impact	Link
Connecting knowledge in the European Open Science Cloud	Workshop - presentation and Jupyter notebooks	Librarians & Repository Managers Funders & Policy Makers Developers 89 views, 74 downloads	https://doi.org/10.5281/zenodo.3517853

Table 11 Reach and impact of FREYA/RDA co-located event

Open Science Fair Workshop: How identifiers can help you in Open Science

This workshop was co-organised by OpenAIRE, FAIRsFAIR and FREYA. Aimed at research support staff, it aimed to provide a "train-the-trainer" workshop style session. Approximately 50 people attended the workshop. 24 evaluation responses were received and all responded to the question, "Did you find this workshop useful?" with "Yes, I feel inspired and empowered" or "Somewhat, I have some new ideas."

Title	Type of Resource	Reach/Impact	Link
How Identifiers can help you in Open Science?	Workshop - presentation and polling results	Librarians & Repository Managers Funders & Policy Makers 98 views, 78 downloads	http://doi.org/10.5281/zenodo.3435387

Table 12 Reach and impact of Open Science Fair Workshop

PID NL Workshop

On November 20 2019, a workshop with a focus on PIDs was organised in The Hague. Several contributions to the workshop had a relation with the FREYA project. The workshop was specifically directed to a Dutch audience, even if the English language adopted reached out to the multilingual community present during the day.

70 people attended the event from a wide variety of institutions, such as universities, research centres, data centres and research libraries. The morning was structured with plenary presentations; while in the afternoon, two series of three parallel hands-on sessions took place[10].

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[10] Full programme: https://docs.google.com/document/d/10orXS38EdIPVqNLuhw94W6LJ9KOkTYoeXuD4gjUow-E/edit?usp=sharing

Figure 8 Lisa de Leeuw (RDA-NL) introducing the day. Photo by Helena Cousijn

In the plenary presentations, Dutch experts introduced the importance of PIDs in the context of good Research Data Management practices and focussed on PID types such as DOIs and researchers' PIDs (ORCID IDs). In the afternoon, the participants were engaged through hands-on sessions that touched on a number of topics/research areas related to PIDs.

One of the sessions introduced PIDs in which the role of FREYA was described. Another relevant session focussed on the FREYA work on the PID Graph. In particular, this session presented the PID Graph applied to NARCIS, the Dutch national portal with information about researchers and their research outputs. The workshop continued with a hands on session in which the audience, divided in groups, was requested to think of case studies where they could see applications of the PID Graph.

Title	Type of Resource	Reach/Impact	Link
PID NL workshop	Workshop - blog post report	Librarians & Repository Managers Funders & Policy Makers 70 attendees	https://www.project-freya.eu/en/blogs/blogs/pid-nl-a-workshop-on-the-use-of-persistent-identifiers-in-the-netherlands

Table 13 Reach and impact of PID NL Workshop

(Effectively) Communicating your research online

This workshop, co-hosted by FREYA, UCL Centre for Digital Humanities, Institute of Historical Research - School of Advanced Study, and DARIAH, took place on 4 December 2019. It aimed to provide an overview of the ways in which historians can build and manage their online profile as a researcher, using tools such as ORCID IDs. It also covered best practices and methods of citing digital resources so that their work is connected and discoverable by others. The afternoon was also an opportunity for researchers to share their experiences in terms of successes and challenges when working with digital resources, and to hear from journal editors about their work and learn how to cite digital objects.

The event had 20 attendees. Of the 13 evaluation responses received, 92% said they were comfortable with the pace of the session and understood the material presented (4 on a scale of 1-4).

Title	Type of Resource	Reach/Impact	Link
(Effectively) Communicating your research online	Workshop - Presentations Blog post	Researchers 118 views, 131 downloads	https://doi.org/10.5281/zenodo.3564210 https://www.project-freya.eu/en/blogs/blogs/communicating-your-research-online-the-how-and-why-for-historians

Table 14 Reach and impact of "(Effectively) Communicating your research online" workshop

Ambassador Webinars

Throughout the project, the team has held ambassador webinars, which were recorded and uploaded to YouTube. Between August 2019 and August 2020, two webinars were held exclusively for the ambassadors, one on 24 September 2019 and one on 25 March 2020. These provided an opportunity for the ambassadors to describe their work with PIDs and for the project to communicate its own developments. Recordings of all ambassador webinars, except the one on 25 March, are available via Zenodo and the project's YouTube channel. The slides and materials from the webinar on 25 March were made available to the ambassadors. Ambassadors consistently respond to feedback that the webinars are useful and relevant to their roles.

Title	Type of Resource	Reach/Impact	Link
Fourth FREYA Ambassador Webinar	Webinar (90 minutes)	Ambassadors 10 attendees/46 views	https://www.youtube.com/watch?v=8CI5Vq3s2bo
Fifth FREYA Ambassadors Webinar	Webinar (60 minutes)	Ambassadors 10 attendees	N/A Webinar was not recorded

Table 15 Reach and impact of ambassador webinars

Other FREYA Webinars (PID Graph Services)

Together with Work Package 2 (WP2), PID Core Services, a set of webinars have been organised around the PID Graph Services being developed by FREYA. One webinar for FREYA ambassadors took place on the 26 of May 2020 and contained an introduction to the Graph QL API released by DataCite at the beginning of May. This webinar was also used as an opportunity to gather feedback from the ambassadors on the planned Common DOI Search. Together with feedback gathered through the PID Forum, more than 90 responses

were collected which was used to shape the last phase of development of the Common DOI Search service. FREYA is planning to hold a webinar for the forthcoming Common DOI Search later in the year.

Title	Type of Resource	Reach/Impact	Link
Webinar - FREYA PID Services: Graph QL API & Common DOI Search	Webinar (60 minutes)	Ambassadors Early adopters 15 attendees/62 views	https://www.youtube.com/watch?v=FevVIt5ngPo&t=1602s
FREYA Webinar: PID Services Registry	Webinar (40 minutes)	Ambassadors Early adopters 20 attendees/29 views	https://www.youtube.com/watch?v=MTM8d0YbfnY
Webinar: The PID Graph in Practice	Webinar (60 minutes)	Ambassadors Early adopters	N/A Future Event

Table 16 Reach and impact of other FREYA webinars

FREYA Final Event

The FREYA final event is planned to take place 16-20 November 2020. The event will be co-organised with the EOSC-Hub and SSHOC (Social Sciences and Humanities Open Cloud) projects. During this three-day event, the projects will showcase their work, including the training activities and materials, and present how FREYA results are integrated into the EOSC landscape.

Title	Type of Resource	Reach/Impact	Link
Joint FREYA - EOSC-Hub - SSHOC event	Event	150–200 people	https://www.project-freya.eu/en/events/joint-eosc-hub-freya-sshoc-event

Table 17 Reach and impact of FREYA final event

2.8.2   Externally organised events

DESIR Winter School—Data and software citation practices and PIDs

Organised by the DESIR project (DARIAH ERIC Sustainability Refined), this workshop took place as part of a wider three day long session on all aspects of research data management in the humanities. There were 30 attendees, of which 10 completed the evaluation, where all said they understood the content presented and were engaged throughout the session.

Title	Type of Resource	Reach/Impact	Link
DESIR Winter School - Data and Software Citation Practices and PIDs	Workshop - presentation recording and slides	Researchers 30 attendees/32 views	https://campus.dariah.eu/resource/ws2019#session-3

Table 18 Reach and impact of DESIR Winter School

DataCite UK Consortium Webinar

This webinar was held on 23 January 2020 and had approximately 40 attendees, who represent the members of the DataCite UK consortium. The purpose of the webinar was to give an update on the activities of the Data Services team at the British Library and the FREYA project. The presentation covered FREYA outputs including the PID Graph, the GraphQL API and the Jupyter notebooks which had been created up to that point.

Title	Type of Resource	Reach/Impact	Link
DataCite UK Consortium Winter Webinar	Webinar (60 minutes)	Librarians & Repository Managers 30 attendees	https://attendee.gotowebinar.com/recording/136245288269212428

Table 19 Reach and impact of DataCite UK Consortium Webinar

IDCC PID Graph Demonstration

A demonstration of the PID Graph was given at IDCC2020 on 18 February 2020 in Dublin during the "Data publishing & preservation demonstrations" session. This demo provided an overview of the PID Graph concept, followed by a live demonstration of working with the PID Graph by using the DataCite GraphQL API and Jupyter notebooks. Reception was generally positive, though there were no concrete suggestions for improvement provided by attendees.

Title	Type of Resource	Reach/Impact	Link
Harnessing the Power of the PID Graph	Presentation	Developers Early Adopters 20 attendees/8 views/ 5 downloads	https://doi.org/10.5281/zenodo.3875047

Table 20 Reach and impact of IDCC PID Graph Demonstration

Turing Way Book Dash

This event took place on 20-21 February 2020. The Turing Way is a project to develop a book, which is described as 'a lightly opinionated guide to reproducible research'. Contributions to the book can be made at any time or through more organised events, called book dashes, which are short intensive workshops to create new content. A member of the FREYA team attended the February 2020 Book Dash held at the Alan Turing Institute in London to contribute information about persistent identifiers. The bulk of the contribution focused around the 'Credit for reproducible research' chapter on adding a section around the

importance of ORCID IDs and updating the section around publishing data with information about DOIs. In addition, a number of images were created illustrating the value of persistent identifiers.

Title	Type of Resource	Reach/Impact	Link
The Turing Way	Online book	Researchers	https://the-turing-way.netlify.app/reproducible-research/credit.html
Images from the Turing Way Book Dashes	Images	Researchers	https://doi.org/10.5281/zenodo.3695300

Table 21 Reach and impact of Turing Way Book Dash

RDC Webinar

FREYA was invited to speak at a webinar organised by Research Data Canada (RDC) on the PID Graph and its potential. In this webinar, an overview of the PID Graph was given, and disciplinary implementations of the PID Graph were demonstrated. In particular, the attendees were introduced to the IGSN scanner developed by PANGAEA, a tool for identifying resources related to geological cores on a smartphone using PIDs alongside several other use cases.

Title	Type of Resource	Reach/Impact	Link
RDC Webinar on The PID Graph and its potential	Webinar (60 minutes)	Librarians & Repository Managers 50 attendees/103 views/5 downloads	http://doi.org/10.5281/zenodo.3759090 https://www.youtube.com/watch?v=BALSvZIkDr8

Table 22 Reach and impact of RDC webinar

SSI Collaborations Workshop Demonstration

This was a demonstration of the GraphQL API and the initial Jupyter notebooks held as part of the Software Sustainability Institute's Collaborations Workshop. Approximately 25 individuals from research software engineering communities, viewed as a key early adopter audience, attended.

Title	Type of Resource	Reach/Impact	Link
Using GraphQL to connect software with authors, publications and other scholarly resources	Presentation	Researchers Early adopters 20 attendees	https://youtu.be/DKWH0hEKiXY

Table 23 Reach and impact of SSI Collaborations Workshop Demonstration

EOSC-Hub Week Demonstration

As part of EOSC-hub week held online from 16 to 18 May 2020, a short demonstrator video was created explaining the PID Graph and DataCite GraphQL API. This video provides a simple explanation of technical concepts and has been repeatedly viewed on YouTube.

Title	Type of Resource	Reach/Impact	Link
FREYA PID Graph	Video Demonstrator	Librarians & Repository Managers Funders & Policy Makers Developers 61 views (EOSC-hub YouTube channel) 250 views (FREYA YouTube channel)	https://youtu.be/IexNhLRtMKY

Table 24 Reach and impact of EOSC-hub Week demonstration

Project FREYA: How persistent identifiers can connect research together - British Library Webinar Series

In response to the COVID-19 pandemic, the British Library Scholarly Communications team organised a series of webinars about the services and initiatives within the Library. On 28 May 2020, there was a short webinar on the FREYA project, which focused on the British Library's pilot application, the Shared Research Repository and the PID Graph.

Title	Type of Resource	Reach/Impact	Link
Project FREYA: How persistent identifiers can connect research together	Webinar (30 minutes)	132 attendees	https://doi.org/10.23636/1182

Table 25 Reach and impact of BL webinar

2.8.3   COVID-19 impact and future events

In early 2020 as the impact of the COVID-19 pandemic became apparent, several training opportunities were curtailed such as an invitation to speak at an RDA Austria node event in Vienna. Several training events and opportunities were moved online (e.g. EOSC-hub week) and FREYA has responded by hosting several more online events to enable more engagement. This has had positive benefits of engaging more users than would have been possible to do otherwise.

During the final three months of the project, FREYA will hold many more online events with a training component to communicate the outcomes of the project to as broad an audience as possible. In addition to the FREYA Final Event, this will include another webinar aimed exclusively at the ambassadors and other webinars to communicate new services such as PIDNotebooks.org and the Common DOI Search.

3   Conclusion

Training materials have been viewed as a core output of FREYA and one, which can be easily integrated into the EOSC. The FREYA project has taken an agile approach to the production of training materials by trying to adapt to users' needs as they have been identified. By extending the timeframe to create training materials within FREYA, the project has also been able to create more useful and meaningful content such as the *Guides to Choosing Persistent Identifiers*, the reach of which indicates their timely publication. Through making efforts to leverage event materials beyond their intended use we have enabled the long-term benefits of the training materials to be realised and that they can continue to do so beyond the lifetime of the project.

Annex: Summary of training materials M1-M33

This table is an updated version of a table produced in D5.4, adapted to include more information and additional materials.

Title of Training material	Type of Resource Description	Reach/Impact[11]	Stakeholder Groups[12]	Link
Knowledge Hub	Online resource containing basic PID Resources	Librarians & Repository Managers Funders & Policy Makers Developers Researchers Publishers 8,639 views	Research Institutions & Academic Organizations EOSC Projects or E-Infrastructures Research Funding Bodies	https://www.pidforum.org/c/knowledge-hub
How Persistent Identifiers Can Improve the Dissemination of your Research Outputs	Guide for researchers about ORCID co-created with OpenAIRE.	Researchers Librarians & Repository Managers	EOSC Projects or E-Infrastructures Researcher Communities	https://www.openaire.eu/how-can-identifiers-improve-the-dissemination-of-your-research-outputs

[11] Where available the reach of the resource is included along with the audience for which it was created. These audiences are mapped to those communities for which the Knowledge Hub was designed. View and download figures correct at 10 August 2020.
[12] These stakeholder groups map to those defined in D5.10 Dissemination and Exploitation plan and in D5.9 Final Outreach Report.

Provenance Services	Webpage summarizing the FREYA work on the development of the PID Graph with a focus on provenance	Librarians & Repository Managers Funders & Policy Makers Early Adopters	Research Data Communities Research Funding Bodies	https://www.project-freya.eu/en/pid-graph/provenance
Research Organization Registry	Webpage summarizing the FREYA work on the development of the PID Graph with a focus on organizational identifiers	Librarians & Repository Managers Funders & Policy Makers Early Adopters	Research Data Communities Research Funding Bodies	https://www.project-freya.eu/en/pid-graph/research-organization-registry
Prototypes of new PID Services	Webpage summarizing the FREYA work on the development of the PID Graph with a focus on the prototypes of new PIDs that have been developed	Librarians & Repository Managers Funders & Policy Makers Early Adopters	Research Data Communities Research Funding Bodies	https://www.project-freya.eu/en/pid-graph/prototypes-of-new-pids
The Power of PIDs	Video describing benefits of PIDs 411 views	Researchers	Researcher Communities EOSC Projects or E-Infrastructures	https://www.pidforum.org/t/the-power-of-pids-video/1063

				https://youtu.be/9G4EMJCwCw4 https://doi.org/10.5281/zenodo.3977942
DataCite GraphQL Support site	Support documentation	Developers Early Adopters	Research Data Communities	https://support.datacite.org/docs/datacite-graphql-api-guide
DataCite Provenance Metadata Tracking	Support documentation	Developers Early Adopters	Research Data Communities	https://support.datacite.org/docs/tracking-provenance
PID Services Registry About page	Support documentation	Developers Early Adopters	(PID) Service Providers Research Data Communities	https://www.pidservices.org/about
Guides to choosing Persistent Identifiers	Documentation/Decision Tree	Developers Librarians & Repository Managers Funders & Policy Makers 1,214 views/1,286 downloads	Research Data Communities Research Funding Bodies	https://doi.org/10.5281/zenodo.3862655

PIDNotebooks.org	Documented computational notebooks	Developers Early Adopters	Researcher Communities	www.pidnotebooks.org
CERN Webpages	Documentation	Researchers	Researcher Communities	https://sis.web.cern.ch/submit-and-publish/persistent-identifiers
Use of Persistent identifiers in PANGAEA Data publications	Documentation	Researchers	Researcher Communities	N/A Not online yet
Introduction to Open Access	Training course	Librarians & Repository Managers	Researcher Communities	N/A Face to face training course
Event Materials				
Software Citation Workshop	1.5 day workshop with presentations covering how to cite software, the benefits, examples of managing citation and advocating for it	Researchers Developers Librarians & Repository Managers Policy Makers & Funders 996 views/359 downloads (all files)	Research Institutions and Academic Organizations Researcher Communities	https://zenodo.org/communities/citesoftware2019/

Power of PIDs Lightning Talk	Lightning Talk presented at CarpentryConnect 2019 illustrating the value of PIDs for software.	Developers Software, Data and Library Carpentry Instructors 31 views/27 downloads	Research Data Communities	http://doi.org/10.5281/zenodo.3361397
RDA UK FREYA Workshop	A workshop discussing the role of PIDs in research and the role of the RDA in their adoption and advancement.	Developers Librarians & Repository Managers Policy Makers & Funders 159 views/170 downloads	Research Institutions and Academic Organizations Research Data Communities	https://zenodo.org/communities/freya-rda-uk-workshop-20190716/
Connecting knowledge in the European Open Science Cloud	Co-located event with 14th RDA Plenary	Librarians & Repository Managers Funders & Policy Makers Developers 89 views, 74 downloads	EOSC Projects or E-Infrastructures Research Data Communities	https://doi.org/10.5281/zenodo.3517853
How Identifiers can help you in Open Science?	Two hour workshop as part of Open Science Fair	Librarians & Repository Manager Funders & Policy Makers 98 views, 78 downloads	EOSC Projects or E-Infrastructures Research Data Communities	http://doi.org/10.5281/zenodo.3435387

PID NL workshop	Workshop co-organised with RDA Netherlands Node	Librarians & Repository Managers Funders & Policy Makers 70 attendees	Research Data Communities (PID) Service Providers	https://www.project-freya.eu/en/blogs/blogs/pid-nl-a-workshop-on-the-use-of-persistent-identifiers-in-the-netherlands
(Effectively) Communicating your research online	Workshop for early career researchers	Researchers 118 views, 131 downloads	Researcher Communities	https://doi.org/10.5281/zenodo.3564210 https://www.project-freya.eu/en/blogs/blogs/communicating-your-research-online-the-how-and-why-for-historians
Joint FREYA - EOSC-Hub - SSHOC event	Project final event	150 - 200 people	EOSC Projects or E-Infrastructures Research Data Communities	https://www.project-freya.eu/en/events/joint-eosc-hub-freya-sshoc-event
DESIR Winter School - Data and Software Citation Practices and PIDs	Workshop as part of three day winter school	Researchers 30 attendees/32 views	Researcher Communities	https://campus.dariah.eu/resource/ws2019#session-3

DataCite Winter Webinar	Webinar organised by DataCite UK consortium	Librarians & Repository Managers 30 attendees	Research Data Communities	https://attendee.gotowebinar.com/recording/136245288269212428
Harnessing the Power of the PID Graph	Presentation/ Demonstration from IDCC 2020	Developers Early Adopters 20 attendees/8 views/5 downloads	Research Data Communities	https://doi.org/10.5281/zenodo.3875047
Turing Way Book Dash Contribution	Online book	Researchers	Researcher Communities	https://the-turing-way.netlify.app/reproducible-research/credit.html
RDC Webinar – The PID Graph and its potential	Webinar	Librarians & Repository Managers 50 attendees/103 views	Research Data Communities (PID) Service Providers	http://doi.org/10.5281/zenodo.3759090 https://www.youtube.com/watch?v=BALSvZIkDr8

Using GraphQL to connect software with authors, publications and other scholarly resources	Presentation recording	Researchers Developers 20 attendees	Researcher Communities Research Institutions and Academic Organizations	https://youtu.be/DKWH0hEKiXY
FREYA PID Graph	Video demonstrator	Librarians & Repository Managers Funders & Policy Makers Developers 611 views (EOSC-hub YouTube channel) 250 views (FREYA YouTube channel)	EOSC Projects or E-Infrastructures EOSC Working Groups	https://youtu.be/IexNhLRtMKY
Project FREYA: How persistent identifiers can connect research together	Webinar Recording	Librarians & Repository Managers 132 attendees	Research Data Communities	https://doi.org/10.23636/1182

Webinars	Ambassador and public webinars providing an introduction to the project and updates on the developments	General PID interest	Research Data Communities Research Infrastructures	https://www.youtube.com/playlist?list=PL1qeJ1JuHlxAzrEntj1cNhqx-7P9wT2-5
Other outputs				
Blog Posts	Blog posts describing the PID Graph concept and some early applications of it.	Early Adopters	(PID) Service Providers Researcher Communities	https://www.project-freya.eu/en/blogs/blogs/the-pid-graph https://www.project-freya.eu/en/blogs/blogs/using-jupyter-notebooks-with-graphql-and-the-pid-graph https://www.project-freya.eu/en/blogs/blogs/tracking-the-growth-of-the-pid-graph https://www.project-freya.eu/en/blogs/blogs/repost-powering-the-pid-graph-announcing-the-datacite-graphql-api https://www.project-freya.eu/en/blogs/blogs/introducing-the-pid-services-registry

pidforum.org PID Graph Category		Developers Early Adopters 6,196 views	(PID) Service Providers Researcher Communities	https://www.pidforum.org/c/pid-graph